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THE IMPACT OF COVID-19 ON SERVICE DELIVERY IN A PUBLIC UTILITY IN TANZANIA: DO E-SERVICE APPROACHES MATTER?

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Abstract

The article aims at enhancing our understanding of the extent to which COVID-19 affected service delivery in public organizations and how e-service approaches provide the potential for sustaining delivery of public services even in times of limited physical interactions. The article uses the Dar es Salaam Water Supply and Sanitation Authority (DAWASA) in Tanzania as a case study. The authors collected data from 149 respondents between June and December 2021. Findings indicate that COVID-19 affected the utility in several ways including a decline in revenue collections, delays in implementing projects, untimely payment of suppliers, and complaints from customers regarding meter readings. The article argues that e-service approaches matter in the delivery of public services. It also identifies the benefits of, and constraints to, effective use of e-services.

Keywords

COVID-19, e-services, water supply, Tanzania

Introduction

The Dar es Salaam Water Supply and Sanitation Authority (DAWASA) is a public utility that supplies water in Tanzania's main business city of Dar es Salaam and in the neighbouring Pwani region. This water utility serves 6,568,416 customers out of 8,174,991 potential customers within the areas of its jurisdiction (EWURA 2023). The utility is responsible for infrastructure development, overall operations, and management of water supply and sanitation services (EWURA 2020). Its annual production capacity is 141.1 million cubic metres while water demand stands at 257.62 million cubic metres per year (EWURA 2023).

Access to basic public services is one of the key indicators of human development and productivity (Afrobarometer 2018). In Tanzania like in many other developing countries, access to basic public services, such as water, remains a major challenge (CAG 2018; 2019). For example, while the government targets to achieve 95% and 85% coverage of water services in urban and rural areas respectively by 2025, the Controller and Auditor General's report reveals that during the financial year 2021/2022 there were 25 urban and rural authorities with a serious shortage of water supply by 10% to 80% of actual demand (CAG 2023:142). In addition, the proportion of population living in areas with water supply network declined from 70% in 2019/2020 to 68% in 2020/2021 in part because of inadequate repair and maintenance of the built infrastructure (EWURA 2021) hence reducing the reliability of the water supply (CAG 2023).

The Energy and Water Utilities Regulatory Authority (EWURA), the sector's regulatory agency, reported that its annual reviews of the performance of water utilities indicated that DAWASA has been underperforming in service delivery (EWURA 2020). In terms of water service coverage, DAWASA covers 89% of its service area and 86% of the population is directly served with water. However, despite these facts, DAWASA was ranked the lowest (10%) in terms of service coverage as compared to Moshi Water Supply and Sanitation Authority (99%), Songea Water Supply and Sanitation Authority (91%), Tanga Water Supply and Sanitation Authority (90%); Mwanza Water Supply and Sanitation Authority (88%) and Musoma Water Supply and Sanitation Authority (88%) (EWURA 2021). On the overall efficiency indicators (OEI), DAWASA appeared the least with an overall efficiency indicator of 48.2% as compared to other utilities such as Arusha Water Supply and Sanitation Authority (98.3%); Dodoma Water Supply and Sanitation Authority (93.9%) and Moshi Water Supply and Sanitation Authority (76.5%) (EWURA 2021).

Because of the nature of its services, DAWASA has many customers who interact with the utility on a daily basis. Over a decade prior to the COVID-19 pandemic, DAWASA established some e-services in areas such as processing of connection applications, billing and payment, and submission of claims even before the outbreak of COVID-19. The purpose of introducing e-services was to improve service delivery in a way that complements other traditional approaches that often involve physical contacts or interaction in delivering services such as physical delivery of papers or submission of applications etc. Notwithstanding the controversial COVID-19 denialist policy of the late President Magufuli's regime, the outbreak of the COVID-19 pandemic in Tanzania, at least in its initial two months, restricted physical interactions in many offices. The pandemic reminded us that we need to seriously consider the use of e-services for continuity of services even in times of limited physical interaction. However, the extent to which the outbreak of COVID-19

affected the utility and its services and how e-service platforms provide the potential for enhancing service delivery remains unknown. This study, therefore, aimed at addressing two questions: (i) to what extent has the outbreak of COVID-19 affected DAWASA and its service delivery? and (ii) In what ways can e-service approaches enhance service delivery in public utilities? It is against this backdrop that this study aimed at finding out the extent to which e-service approaches have the potential to enhancing service delivery.

Literature Review

E-Service

Developments in science and technology have made it possible for the emergence of new approaches to service delivery. Traditional face-to-face service delivery interactions between service providers and citizens are now being complemented and/or supplanted by e-services (Ancarani 2005; Overby 2008; Barth, Veit 2011). The literature on e-services generally defines *e-service* as the interaction between the service provider and the service user through the internet (Surjadja et al. 2003; Javalgi et al. 2004; Hassan et al. 2011). Jennifer Rowley offers a more encompassing conception of e-service. This author defines e-service as “deeds, efforts or performances whose delivery is mediated by information technology (including the Web, information kiosks, and mobile devices” (Rowley 2006, 341). This conception is comprehensive because it takes into account all sorts of interaction between the service provider and the customer that is aided by information and communication technology including the use of mobile phones and other digital means (Hassan et al. 2011). In the last two decades, e-government and the application of e-services in the public sector have increasingly become key elements in public administration and information systems (Lindgren, Jansson 2013). The most dominant themes in the e-service literature tend to focus on the quality of e-services (Gefen 2002; Chaffey, Williams-Edgar 2002; Parasuraman 2002; Buckley 2003), the relationship between the web experience and customer behaviour, customer satisfaction, intention to buy and loyalty (Rowley 2006). The literature generally identifies four types of e-service interactions in public organizations. These include government-to-government (G2G), government-to-citizen (G2C), government-to-business (G2B), and government-to-employee (G2E) (Rust, Kannan 2002; Pascual 2003; Seifert 2003; Evans, Yen 2005; Siau, Long 2005). As shall be seen in the analysis of the present study, G2C and G2B interactions are the focus of the article. However, there is hardly any empirical evidence about the extent to which COVID-19 restrictions affected a public utility in the context of Tanzania. This article aims at addressing this gap.

The Outbreak of COVID-19 and its context in Tanzania

The outbreak of the COVID-19 was first reported in the Huanan Seafood Wholesale Market in Wuhan, China in December 2019 (Wu, Chen, & Chan 2020). Between January and February 2020 the virus rapidly spread to other parts of China and other countries around the globe. On 11 March 2020 the World Health Organization (WHO) declared the COVID-19 a pandemic (WHO 2024). The COVID-19 pandemic left an enduring impact on human life across the globe. The pandemic caused more than 6.8 million reported deaths worldwide (Elflein 2023); led to negative socio-economic consequences across countries.

Some companies were compelled to scale down production levels leading to laying off employees, others were completely shut down in response to strict travel measures including lockdowns. Sectors such as tourism, hospitality, and transport and logistics were hit hard. Socially, the pandemic increased the burden on health and social security systems (World Bank 2022). As a result of social distancing measures, the provision of social services including water was also affected. The traditional face-to-face interaction between service providers and customers became challenged (Cook, Makin 2020).

The first case of COVID-19 was officially reported in Tanzania by the Ministry of Health on 16th March 2020 (Tarimo, Wu 2020). Between March and May 2020 the government of Tanzania implemented some measures recommended by WHO. These included the closure of schools, colleges and universities; suspension of sports and political rallies; public awareness campaigns (handwashing, use of hand sanitizers, wearing of masks, COVID-19 testing for those traveling to and from abroad, and reporting of COVID-19 cases (Macdonald, Molony, Lihiru 2023; Selenya 2023). These measures did not last long as President Magufuli's policy drastically twisted against these measures. In June 2020 President Magufuli not only announced that Tanzania was a COVID-19 free country but he also suppressed any views that contradicted his government's version of COVID-19 (Macdonald et al. 2023). All schools were re-opened. However, he encouraged citizens to pray and use steam inhalation and local herbs as an alternative COVID-19 therapeutic (Lee, Meek, Katumusiime 2023). Unlike neighbouring countries in the East African region, which imposed lockdowns and strictly followed WHO guidelines on COVID-19, Tanzania's President Magufuli believed, largely for economic expediency, the virus was not a big deal as the economy was more important than anything else. To be sure, he emphasized:

We have had a number of viral diseases, including AIDS and Measles. Our economy must come first. It must not sleep. If we allow our economy to sleep, we will not receive salaries...I am sure there will be a serious food shortage next year because demand will be high in countries that are on lockup. That will be the right time for those of us who work hard to help our colleagues because they will have no food (The Citizen, 17 May 2020).

The implication of President Magufuli's denial of COVID-19 in the context of public service delivery is that the situation exposed service providers in the public sector and citizens at health risks especially because no one, including medical personnel, was allowed to publicly inform people on the prevalence of the virus. Some of the effects of Magufuli's COVID-19 policy included the fear among workers of utilities as shown in this study because service delivery largely depended on physical contacts, rumours of several unreported deaths related to COVID-19 complications, and limited hospital capacity to handle COVID-19 cases (Buguzi 2021). On 17th March 2021 the Vice President, Samia Suluhu Hassan announced the death of President Magufuli following days of speculation about his health and whereabouts and the government's insistence that he was fine and ostensibly continuing with his work. The death of Magufuli marked a shift in government's response to COVID-19. His successor, President Samia, began implementing measures that not only acknowledged the presence of COVID-19 but also encouraged citizens to take necessary precautions including vaccination.

Methodology

Data collection for this study was done between June and December 2021. The study used both qualitative and quantitative approaches to collect data. A triangulation approach was used through the use of different data collection methods for the purpose of facilitating cross validation of information. The study used DAWASA in Tanzania as a case study with particular focus on six districts in the Dar es Salaam and Pwani regions. The districts included Kinondoni, Ilala, Temeke, and Ubungo in the Dar es Salaam region and Bagamoyo and Kibaha in the Pwani region. These districts were purposely selected for the study because they are covered by this utility, and they experience performance challenges as identified by government reports. The study covered a total of 149 respondents. Three major data collection techniques were used. These included (i) face-to-face interviews with a total of 26 respondents: five being DAWASA officials and 21 local government officials. In addition, a questionnaire was administered to a total of 123 DAWASA customers with almost equal distribution from each of the six districts covered by the study as shown in Table 1.

Table 1. Number of respondents by district

District	Freq.	Percent	Cum.
Ubungo	19	15.45	15.45
Ilala	22	17.89	33.33
Bagamoyo	20	16.26	49.59
Temeke	20	16.26	65.85
Kibaha	20	16.26	82.11
Kinondoni	22	17.89	100.00
Total	123	100.00	

Source: Own study.

Key informants for the interviews were purposively selected in order to offer specific information based on their knowledge and experience in working with DAWASA. The selection of service users and the Ward Executive Officers (WEOs) was done randomly in order to avoid bias. Only households with water connections were included in the sample. The study complemented these primary sources of data with secondary data from documentary sources such as reports, newspapers, and internet sources. The distribution of all respondents' categories is shown in Table 2.

Data analysis was done through both content analysis and descriptive analysis. For qualitative data drawn from interviews, the study used content analysis after identification and categorization of the various themes. Data from service users (DAWASA customers) obtained through questionnaires was analyzed using the stata software for simple statistical manipulations such as frequencies and percentages regarding their perception and rating of services offered by the utility.

Table 2. Distribution of respondents' categories and response rate

BS/N	Respondents' Categories	Total
1	Service Users	123
2	Ward Executive Officers (WEOs): Bagamoyo (2), Kibaha (1), Ilala (2), Kinondoni (2), Temeke (2), and Ubungu (2)	11
3	City/Municipal/District/Town Council Officials	10
4	DAWASA officials	5
	Total	149

Source: Own study.

Findings and Discussion

Demographic information of customers

Both male and female respondents were interviewed. However, the number of female respondents was proportionally higher (57 per cent) than the male respondents (43 per cent). This is more likely as the survey was conducted during the daytime where more females were more likely to be at home compared to the male respondents who in most cases had gone to work for their families. In terms of educational qualifications of respondents, those with secondary school level were 32 percent followed by primary school level (27 percent). The remaining 40 percent had higher education levels (18%), tertiary education (17%), and postgraduate level (6%).

Customers' rating of e-services offered by DAWASA

Responses from questionnaires indicate that majority of customers (63 per cent) are generally satisfied with e-services offered by DAWASA. Most of the e-services positively rated by customers are related to e-billing (21% rated it 'very good' and 18% rated it 'good'), e-payment of bills (47% rated it 'very good' and 33% rated it 'good'), e-payment of connection charges (21% and 40% rated it 'very good' and 'good' respectively). The positive rating of these e-services is no surprise because of the convenience associated with the digital receipt and payment of bills. The bills are sent to individual customers' mobile phones through SMS with control numbers and customers can pay using their mobile money transfer applications which makes it easier for customers to settle their monthly bills without being required to physically go to DAWASA offices as was the case previously.

On the contrary, e-handling of customers complaints and the way DAWASA responds to customers' emergency calls were both poorly rated. More than half of the customers interviewed were not happy with the utility's handling of customers' complaints. 27% of respondents rated this aspect 'poor' and 25% of them rated it 'very poor.' These findings are consistent with EWURA's (2020) report that faulted the utility for unsatisfactory performance in addressing customers' complaints. Similarly, 21% of the respondents rated the utility's response to emergency calls 'poor,' and 37% rated it 'very poor.' Other concerns raised by customers during interviews include untimely response to customers' enquiries,

poor customer service, inadequate involvement of customers in meter reading, and delays in connecting new customers. Meanwhile, the majority of customers indicated that they had limited knowledge about the adequacy of information provided by the utility on its website. When asked “how would you rate the adequacy of information on DAWASA’s website,” 58% responded “I don’t know.” These responses imply that the majority of customers have limited web-based interactions with the service provider. As such, DAWASA needs to consider investing more on digital means other than the website to effectively communicate with its customers.

Impact of COVID-19 on DAWASA’s services

In seeking to understand the extent to which services delivered by DAWASA were affected by the outbreak of COVID-19, researchers posed questions to the public utility, government officials and service users. To the utility, the question was: “How was service delivery in your organization affected by the outbreak of COVID-19?” To the local government officials and service users the same question was asked: “To what extent do you think services offered by DAWASA were affected by the outbreak of COVID-19?”

Responses to these questions varied. A few respondents, for example, believed that COVID-19 had little or no impact on services delivered by the public utility. To this, one respondent had this to say:

I do not seriously think if the delivery of water was affected. As far as I know, the services continued only that many people unlike in normal days preferred to access those services online through the use of internet” (Interview with ICT Officer, Bagamoyo 17.06.2021). Another respondent from the local government shared this position by asserting that: “Apart from the fear among staff to physically interact with customers, there were no effects on the delivery of services as these continued being accessible as usual (Interview with Dar es Salaam City Electricity Engineer 04.06.2021).

Yet the majority of others interviewed including DAWASA officials, government officials, and customers alike, had a different view. These respondents point out several ways in which the delivery of water was affected by the outbreak of COVID-19. While the pandemic led to increased demand for water at family and individual levels as people were required by authorities and health experts to wash their hands regularly as one of the measures to deal with the outbreak, the consumption of water by companies and businesses declined due to closures and water bills were not paid on time leading to declining revenue on the part of DAWASA. Interviews with officials and customers underscore the socio-economic impact of the pandemic as discussed in the ensuing section.

Socio-economic Impact of COVID-19 on Service Delivery

This section highlights the impact of COVID-19 on DAWASA and its services from the perspectives of local government officials and officials of the utility. According to these officials, the delivery of service was affected in a number of ways including: decline in water consumption especially for some of their big customers such as hotels; decline in revenue collection; limited physical interaction with their customers; fear among workers; and complaints regarding meter reading and bills from customers; among others.

When asked as to what extent was DAWASA's service delivery affected by the outbreak of COVID-19, one official at the utility's Head Quarters, for example, cited multiple effects of the coronavirus. The official responded:

Despite using telephones, fax, email, and the like, we have a certain category of customers who feel it is necessary that they should physically come to our offices to get us fix their concerns. We also have to make follow-ups on payment of bills from our customers. But during the first wave of the outbreak in March 2020, we had difficulties doing these physical follow-ups. On the other hand, our customers were also unable to pay their bills on time because their income-generating activities were affected. Collections dropped because some of our customers were sick, others could not pay until the service was disconnected. In order to cope with the situation, "we tried to ensure that all staff were sensitized and equipped with safety gears so that all were protected. In addition, the use of mobile phones or telephone communication was intensified at the time just to minimize the risks of physical contacts (Interview, DAWASA official at Head Quarters 25.08.2021).

The economic and social effects of COVID-19 were also reiterated by other respondents from Ubungu Municipal Council, Kibaha Town Council, and DAWASA Ilala Regional Office. Representing the Municipal Director of Ubungu Municipal Council, one IT official noted: "In a way services were affected because the number of customers who still cannot use e-services is relatively bigger than those who electronically access utility services. In fact, even service providers were affected in terms of revenue collections (Interview 04.06.2021). In addition, because customers were required to wear masks before entry into public offices, those who could not access e-services were affected as the Kibaha Town Council Engineer observed: "I think those who wanted to go physically to the offices of the service providers were the most affected because they were required to have such things like face masks and sanitizers to be allowed entry into the service providers' premises. On the other hand, service providers were also affected in terms of declined revenue collections" (Interview 11.06.2021).

In another interview, an official from DAWASA Ilala Regional Office, was of the view that DAWASA was affected by the outbreak of the COVID-19 pandemic to a large extent. The official reiterated:

DAWASA was to a great extent affected. Many businesses were closed as a result of which water consumption dropped. Staff were also afraid of physically interacting with customers. Some customers were also unable to pay their bills on time. Although I do not have specific figures of collections for this region, collections certainly dropped because of the COVID-19 outbreak. For example, before I came here, I was in Tegeta Regional Office where I served as the Business Manager. While there, we used to collect Tsh. 1.5 billion but after COVID-19, by April 2020 collections had dropped to Tsh. 1.3 billion per month (Interview DAWASA official, 27.08.2021).

Underscoring the economic dimension of the effect of COVID-19 and how the pandemic affected revenue collection, an official from Kinondoni DAWASA Regional Office revealed: "collections dropped because some customers did not want physical interactions, which limited our staff from going to remind customers to pay their bills. For example, in February 2020, revenue collection (in Kinondoni Region) stood at Tsh. 1.4 billion but in March 2020 it dropped to Tsh. 1.3 billion. In April 2020 it further dropped to Tsh. 1.2 billion. Usually meter reading involves customers, but because of the COVID-19 outbreak it was not possible because of the restrictions on physical interactions between our staff and customers. This led to complaints from some customers thinking the bills were not realistic or had been inflated. In addition, some staff were also not coming to the office, es-

pecially those who were on site. In order to cope with the situation, we opted to use SMS to remind and encourage our customers to pay their bills and check if the meter reading was correct and report any issues to DAWASA should it be necessary” (Interview 26.08.2021).

Moreover, restrictions on international travels created a scarcity of some materials due to delays in shipment. This affected the delivery of some services in different sectors worldwide. DAWASA too was affected as some of the services could not be delivered timely due to the effects of the pandemic. As one DAWASA official revealed in an interview, the utility faced a shortage of some materials subsequently affecting the implementation of some projects. The official’s response is illustrative:

Most of the materials we use are imported from other countries but during the outbreak of COVID-19 we could not timely secure the materials we wanted for new water connections. This created a deficit of materials and equipment which subsequently affected our efficiency in attending to our customers’ needs. Even some projects slowed down due to delays in securing materials from abroad. This had a negative effect in terms of projects costs because it led to additional costs of the projects (Interview 31.08.2021).

Data from these interviews generally indicate that the outbreak of COVID-19, especially the first wave that occurred between March and May 2020 had serious effects on the utility’s revenue collection as evidenced by the following response:

We were seriously affected by the first wave between March and May 2020. In terms of overall collections for the Dar es Salaam and Pwani regions, we dropped from Tsh. 12.1 billion in March 2020 to Tsh. 8.9 billion in May 2020. We even had difficulties in paying our suppliers. Customers were not paying as expected because of the outbreak. The outbreak also caused some inconveniences to our customers. Offices were not closed but in order to maintain social distancing, customers were not allowed in the office. We were serving them while outside. The second and third waves were not as tough as the first one (Interview, DAWASA official 30.08.2021).

The Potential of E-services to Enhancing Service Delivery

In examining the potential of e-services to enhancing service delivery, the authors asked respondents to: (i) describe the services that their organization offers to customers through electronic means, and (ii) state the extent to which they perceive the use of e-services has improved efficiency, effectiveness and satisfaction of customers in service delivery. In response to the first issue, this study found that DAWASA has a number of e-services that are currently in use as presented in the following section.

E-Services Offered by DAWASA

When interviewed by the authors regarding the kind of e-services offered by DAWASA, most officials mentioned e-billing system, customer relations management (CRM), meter reading, service application forms, and WhatsApp, among others. Officials indicated that they interact with their customers through a number of digital means. “There are a number of services that we offer through e-systems. For example, service application forms are available on our website. After a survey has been done, our customers are informed of what they are supposed to do via SMS. In addition, all billing services for residential and small business customers are done through E-DAMS, which is an electronic billing system that started in 2005. All our customers, except the big ones, receive their bills

through SMS. All notifications and reminders are done through SMS. Customer Relations Management (CRM) launched in 2017 is a customer complaint handling system through which complaints from customers are received and addressed. Another e-system is the meter reading system known as the LP Reader. We have also created WhatsApp groups to facilitate interactions between our regional offices and customers. Information regarding meter reading and education related to our services (posters) is often shared through these WhatsApp groups” (Interview with DAWASA official 25.08.2021). Customers are also able to pay their bills using electronic money transfers through mobile phones money transfer systems such as Tigopesa, Airtel money, M-pesa, SimBanking, to name just a few.

While the use of e-services is increasingly becoming inevitable, some of the e-services offered by DAWASA are still not fully electronically provided. For example, the e-billing, while it has significantly reduced inconvenience to customers, is not fully automated. Meter readers still have to physically get to customers’ premises to be able to capture data on water usage and transfer that data from the meter reading gadget to the bill processing system. This has, at times, attracted complaints from customers who think the readers still inflate their bills as one customer lamented:

DAWASA’s billing is still problematic as it still depends on meter readers. These readers feed wrong data to the system which eventually produces unrealistic bills that vary every time. For example, in April and May this year I received a bill that was twice the regular bills I normally receive. Why are they not using smart meters to prevent their staff from giving us wrong bills? (Interview 11.06.2021).

These customers believe that the installation of pre-paid water smart meters, just like the *LUKU* used for electricity by the Tanzania Electricity Supply Company Limited (TAN-ESCO), would help to eliminate complaints from customers regarding perceived inflated billing. Even the service application for new connections, apart from the forms that are available on the utility’s website, the rest of the application processes are paper based. One official admitted:

Most of the processes are still done manually. For example, customers are still required to bring introduction letters from their respective local government authorities, and then we open files or accounts. But we would wish to see our customers using e-systems to accessing most of our services (Interview 30.08.2021).

The Potential Benefits of E-Services in Service Delivery

There are several benefits of using e-services. These include enhanced efficiency, customer satisfaction, easy access to data for business and administrative decisions.

Enhanced efficiency

E-services have helped to reduce holes for leakage or theft of the organization’s money. This was evident in interviews with DAWASA officials who observed that the use of e-services has significantly improved, among other things, their revenue collections. One respondent observed, for example, that since the adoption of the electronic payment system a lot of money, which was previously lost through theft, is now safe. The revenue col-

lections have increased by a factor of nearly four than was the case before the adoption of e-services. The official states:

The use of electronic transfers to settling bills has greatly improved the security of the company's money and reduced holes for leakage or theft. For example, previously before 2013, customers were required to collect their bills from our offices and payments were made in the offices. This in a way caused a lot of security risks and inconveniences for our customers due to overcrowding of people at our offices. It has also improved revenue collections. For example, before 2013 the company's revenue collections stood at an average of Tsh. 3 billion per month. However, from 2015 onwards collections have significantly increased to about Tsh. 11 or 12 billion per month. We believe the use of e-payment systems has significantly contributed to revenue increase (Interview with DAWASA official 30.08.2021).

Apart from increased revenue collections, e-services also allow the service provider to reach as many customers as possible within a relatively short time and with less resources as opposed to physical interaction. When asked "To what extent do e-service approaches provide the potential for enhancing service delivery in public institutions?" one DAWASA official observed: "they have a great potential. Our customers are very scattered. As such, the use of e-services provides the potential for enhancing efficiency in the way we serve our customers as opposed to relying on paperwork" (Interview 27.08.2021). The implication of these findings for service delivery is that organizations that have robust and functional e-service systems may still be able to provide services and interact with their customers even in the face of such adversity as the COVID-19 pandemic.

Increased customer satisfaction

The use of e-services has the potential to reduce inconvenience to customers. Before the adoption of e-services, DAWASA customers were required to go either to the banks or the utility's offices to pay their bills. This, in most cases, created a lot of inconveniences for customers as they had to queue for a long time before they were attended to. Even the monthly bills had to be physically picked up from the utility's offices. With the aid of technology, it is now possible for customers to receive their bills through their mobile phones and they can actually pay through mobile money transfer services anytime from anywhere without incurring any travel costs and other associated inconveniences. In this way, the use of e-services not only helped customers to save their time and resources, but it also helped to minimize the risk of contracting COVID-19 through physical interaction. This is partly why the e-payment of bills and connection fees were positively rated by customers as shown earlier in this article. Responses from interviews echoed this view as the following interview response attests:

The use of e-services has enhanced customers' satisfaction as they do not have to physically come to our offices as long as their complaints or some applications are made online, and we respond accordingly (Interview with DAWASA official 26.08.2021).

Enhanced data management

Since most of the information is available in a digital form, data can quickly and easily be accessed when required for business or administrative purposes. Even administrative

routines such as preparation of reports can possibly be accomplished within a short time because of easy access to business and/or customers' records. Since DAWASA is a public utility, being required to provide information to the government and its agencies is not uncommon. In such cases, as one respondent emphasized: "it is easier to access and provide the information when required by other authorities" (Interview 31.08.2021).

Challenges constraining the effective use of e-services

Reliability and speed of the internet

The use of e-services is not without challenges. One of the biggest challenges cited by many respondents is the reliability and speed of the internet. More often than not the speed of the internet is very low, and it affects work especially for activities that depend on the availability of the internet. One respondent had this to say:

Here in Dar es Salaam we have a serious problem with internet speed. Despite having the national fibre optic network, we still do not see its impact on enhancing the speed of the internet (Interview with a local government official 04.06.2021).

The slow speed of the internet or network jams sometimes affects e-service systems such as e-billing, especially in generating information such as control numbers (payment code) and invoices related to customer bills. This problem not only disrupts work, but it also affects revenue collection as evidenced by one respondent who remarked: "All payments are done centrally after being given a control number, whenever we have a network breakdown, we receive a lot of complaints from our customers. And this affects revenue collections and leads to additional expenses as we have to make calls to handle complaints" (Interview with DAWASA official 25.08.2021).

Awareness among customers in using e-services

Despite having some of the e-services available on the utility's website, 58 per cent of the customers interviewed by this study indicated that they were not aware of these services on the utility's website. This implies that the interaction between customers and the utility on the utility's website is limited to a few customers. Yet, other customers, particularly institutions, still prefer using the traditional (face-to-face) approach such as the printing out of bills. Other customers have little trust in e-services. "Many of our customers still believe their problems cannot be solved unless they come physically to our offices" (Interview with DAWASA official 31.08.2021). Some studies from Poland report similar beliefs where some service customers hold "a strong belief in the value of paper documents" (Kuzior, Manka-Szulik, Krawczyk 2021). While officials from the utility attribute this challenge to inertia and a relatively low level of awareness among some customers on the use of e-services, officials from the local government and customers perceive unresponsiveness of DAWASA officials when customers attempt to interact with them through online platforms as a contributing factor. One local government official in Bagamoyo, for example, noted:

many people complain that DAWASA officials are not timely responding to online inquiries. In most cases people have been calling them but their phones were going unanswered, or they may receive the call and tell you to visit their office for an issue that would be solved online. This reinforces the perception that online systems are not as effective as physical presence at the utility's offices (Interview 02.12.2021).

Perceived high cost of the internet and e-service systems

On the one hand, reports suggest that Tanzania is one of the ten countries with cheapest cost of mobile data in Africa. One gigabyte of mobile internet, for example, is estimated to cost an average of USD 0.71, which is equivalent to about 1,661 Tanzanian shillings (Kamer 2022). This is considered to be cheaper when compared to other Sub-Saharan African countries whose average cost of one gigabyte stands at USD 4.47. Internet users, especially social media users, on the other hand, have been complaining about the cost of data bundles offered by internet service providers in the country. In August 2022, for example, there was an outcry among twitter, facebook, Instagram, and WhatsApp users in Tanzania over a perceived hike in data bundle charges prompting the Minister responsible for Information and Telecommunications to issue a statement indicating that the cost of internet data had actually dropped from 40.04 TZS in March 2021 to 9.35 TZS in August 2022. The concern of social media users over the cost of mobile data underscores the perception among internet users that the internet is relatively expensive for a person with a meagre income. Such perceptions discourage other mobile phone users from using e-services for fear of incurring extra costs for data. Related to this is the fact that technology is relatively costly. In order to have an effective e-system as one respondent observed "there has to be some investment. Balancing the cost of producing electronic devices and the need to reduce the cost of services to customers is challenging" (Interview, 03.08.2021). The challenge lies in the fact that the majority of citizens still cannot afford the costs associated with e-services. For example, a survey done by Research ICT Africa in 2017 suggests that 64 % of the population in Tanzania 'cannot afford internet-enabled devices' such as smart phones (Gillwald, Mothobi 2019: 21–22).

Dependency on foreign support services

Most of the systems are developed and maintained by companies outside the country. Whenever the e-systems experience trouble, the utility relies on expertise from a foreign service provider to fix the problem. In addition, the fact that these e-systems are developed by foreign companies, the utility must pay for the licence. The following response from one DAWASA official is illustrative: "One of the challenges is that most of the internet systems we use to run our services are designed and maintained by foreign companies. For example, the E-DAMS, which is a billing system, is provided by someone from outside the country. So we must pay for the licence" (Interview with DAWASA official 26.08.2021).

Limited access to the internet

One of the biggest challenges confronting the application of e-services in service delivery in Tanzania is access to the internet. The majority of customers have limited access to the internet. Some customers do not even have smart phones. Even though a significant number of the population is estimated to be possessing mobile phones, most of these can

only perform a limited number of e-services such as e-payment of bills and SMS. This challenge is not peculiar to Tanzania. For instance, it is estimated that around 55% of the world population had access to internet services by 2021. The majority of this access is in North America (83%) and Europe and Central Asia (78%). Sub Saharan Africa is estimated to have only 22% of its population having access to internet services (Statista 2023). According to a survey done in 2017 by Research ICT Africa, 'Beyond Access Survey,' 86% of the rural population in Tanzania had no access to the internet compared to 44.6% of their counterpart urban population (Mothobi, Moshi 2017). This differential access to the internet is a manifestation of the digital divide between urban and rural areas compounding the challenge of access to e-services by the majority of the population, especially the rural poor.

Conclusion and implications

This article has shown that access to basic public services such as water in Tanzania is still a major challenge. The outbreak of the COVID-19 pandemic complicated the situation. Using DAWASA, a public utility providing water and sanitation services as a case study, findings have shown that COVID-19 affected the utility in several ways including a decline in revenue collections, delays in implementing projects, untimely payment of suppliers, and complaints from customers regarding meter reading.

The article has also shown that despite the limitations regarding the scope of e-services offered by DAWASA, e-services have the potential to increase efficiency, customer satisfaction, and enhance data management, among other things. It is possible to reap greater benefits even in times of adversity with enhanced use of e-services. This observation is consistent with studies from other countries that confirm the benefits of e-services especially in times of restricted social mobility (Ibrahim, Mutiarin, Purnomo 2021; Kusto, Klepacki 2022; Nguyen, Tran 2022). Despite these potential benefits, DAWASA is still unable to tap into them because of the challenges that face many African countries, Tanzania included. These challenges that constrain the effective use of e-services include unreliability and low speed of the internet, limited awareness among customers on the use of e-services, perceived cost of the internet and e-service systems, limited access to the internet among majority of the population, and dependency on foreign support services. Unless some deliberate policy interventions are done to address the issues of access to the internet, investment in e-services, awareness among users, reliability and speed of the internet, the potential benefits of e-services will remain untapped. This study draws lessons from other administrative systems such as those in Poland and elsewhere which prior to the COVID-19 pandemic had low levels of digitization in public and local government institutions but made deliberate efforts to promote e-services (Kusto & Klepacki 2022). From the management point of view, accountability and responsiveness of the utility's staff to customers need to be enhanced in order to promote not only effective online citizen-service-provider interaction but also to build trust for the use of e-services among customers.

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